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# E-procurement and its impact on supply management – evidence from industrial case studies

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## Abstract

Many buying firms have adopted e-procurement systems, yet the impact of these applications is still being assessed by both academics and practitioners alike. This article examines the use of e-procurement within four multinational firms, to establish the impact of these mechanisms on their approach to the supply market, using thematic parameters derived from the literature. The results indicate that the firms established a clear supply market strategy based on a segmentation model: e-procurement tools were used as tactical means to implement and extend that strategy towards the supply base. In addition, it was observed that tactics within defined segments are developing, as buying firms use e-procurement tools both to reduce supplier numbers and to leverage their volumes in price-competitive markets. Some propositions are offered on the key themes, summarising the findings in the paper and providing further indications for research.

**Keywords**: e-procurement; purchasing; supply management; supply strategy; supplier segmentation

## Introduction

The e-commerce tools available to purchasing managers have developed at a rapid pace and through the universality of the world wide web, new technology is becoming widely available at low cost, replacing former systems such as electronic data interchange (EDI). A range of applications, under the title of e-procurement, has been adopted by buying firms and the landscape for this technology has become increasingly complex, through the use of automated buying systems, electronic catalogues, e-marketplaces, market aggregators, online reverse auctions and supporting tools for supplier search and analysis.

This move towards more automation within the purchasing function has led to suggestions that relationships with suppliers and the supply market are destined to change, as technology provides the opportunity for different types of buyer-supplier interaction. Proposals from some of the early electronic marketplace operators such as Covisint and Transora suggested that not only transactional buying but also complex supply chain collaboration would be quickly moved to the web. However, some of these predictions have proven unfounded as, after ten years of e-procurement applications, the impact of such technologies is still being evaluated, by both academics and practitioners alike.

The aim of this paper is to examine how users of e-procurement in buying firms have deployed these applications and how this deployment has impacted on their use of the supply market. Here 'supply markets' refers to separate segments of the external spend of buying firms, as identified through a segmentation model. The research approach is based on case studies of organisations who have implemented e-procurement and have experience of deployment of these applications for a minimum of two years. In investigating these buyers' projects, some key themes were used as parameters, which were extrapolated from the literature. The paper describes the methods used in this research, discusses the findings from the cases and concludes with a number of propositions derived from the case results, which correspond to key themes from the literature on e-procurement.

## E-procurement, suppliers and supply markets

### *Overview*

Supplier relationship types have been one of the main themes in the purchasing literature. In recent years, the trend has been away from the traditional arms-length or transactional relationship which is focussed on price, towards closer, co-operative interactions with fewer suppliers (Ellram, 1991; Krause, 1997; Cousins, 1999; Burt *et al*, 2003). Suppliers are increasingly seen as vehicles to add value to the buying organisation and in some cases should be more closely integrated into the supply chain. Hence there has been a move towards collaborative supply chain solutions which use information sharing and joint planning to create joint benefits for buyer and supplier (Matthyssens and Van den Bulte, 1994; Goffin *et al*, 1997; Ellram & Edis, 1996). However, distinction is made between direct and indirect spend, where direct spend becomes the more strategic area of concern. Consequently, buyers operate a mix of relationships, according to defined criteria. The differentiated approach to spend categories through a segmentation matrix was originally proposed by Kraljic (1983) and developed by others (Bensaou, 1999; Gelderman & van Weele, 2002) and remains a core part of purchasing strategy. Table 1 summarises the differences in the two relationship modes, which have been extrapolated from the literature cited here.

Table 1: Transactional and Collaborative relationship types

| **Features** | **Transactional** | **Collaborative** |
|---|---|---|
| **Timescale** | Short-term | Long-term |
| **Type of interaction** | Transaction-based | Relationship-building |
| **Relationship driver** | Power | Added value |
| **Focus** | Price | Joint profit |
| **Style** | Contractual | Trust-based |
| **Planning** | Separate | Shared |
| **Attitude to gains** | Win-lose | Win-win |
| **Integration** | Minimal | Extensive |
| **Management commitment** | Low | High |

In relation to e-procurement, Carr & Smeltzer (2002: 294) emphasise that: 'the changing nature of buyer-supplier relationships, as the use of information technology becomes more important, has not been investigated'. Indeed, as a newly-emerging phenomenon, e-procurement is only now being explored in depth and a growing body of literature is emerging covering issues such as benefits and disadvantages, adoption, implementation, governance, and costs (Croom, 2000; Tatsis *et al*, 2006; Angeles & Nath, 2007). The emphasis in this paper is on the impact of e-procurement usage on supply management, which will be the focus of this literature review. An analysis of relevant articles identified the following key themes.

***Communication:***

McIvor *et al* (2003) state that the developing e-commerce technologies have a considerable impact on patterns of communication between supply chain members. Web technology can improve the communication flow in the supply chain as it facilitates information exchange between trading partners (McIvor & Humphreys, 2004). Carr & Smeltzer (2002) found that interaction frequency increased as IT improved ease of communication. In a study of e-procurement in public sector organisations in the UK, Croom and Brandon-Jones (2007) found that increases in communication between customers and suppliers assisted knowledge sharing. Information provision in areas such as forecasts and inventory management can enable collaboration between buyers and suppliers (Puschmann & Alt, 2005). Similarly, data exchanged on demand or raw materials flow can assist with co-ordination of production for both trading partners (Lancioni *et al*, 2003).

***Integration:***

In principle, increased levels of information exchange can lead to greater integration with suppliers (Garcia-Dastugue & Lambert, 2003). McIvor & Humphreys (2004) report that web-based buying systems reduce the cost of integrating suppliers. A survey by Pearcy & Guinipero (2008) found that alternative e-procurement applications lead to quite differing levels of integration. On the other hand, in a survey of companies adopting e-Procurement, Davila *et al* (2003) found that there was actually little real integration with suppliers. Angeles & Nath (2007) found that system integration was one of the major challenges to successful e-procurement implementation. Incompatibility of systems may also be a barrier to close integration with suppliers (McIvor & Humphreys, 2004).

Smart (2008) found in three case study examples of e-Procurement adoption that the degree of integration between buyers and suppliers was very limited. Finally, Cagliano *et al* (2005) suggest that the tools used in e-procurement are not aimed at integrating inter-firm processes, but are designed for increasing purchasing efficiency.

***Compliance:***

One of the drivers for e-procurement adoption for buyers has been the need to improve compliance, such as compliance to the use of approved suppliers (Puschmann & Alt, 2005). The authors report that some companies will do bundling of spend in order to achieve improved terms and maintain adherence to contract. The problem of non-compliance is also referred to as eliminating 'maverick' spending - Corini (2000) refers to a report by Deloitte Consulting in which controlling maverick spending was cited as a principal benefit of e-procurement. Angeles & Nath (2007) found that implementing an e-procurement system did not necessarily eliminate the problem of maverick buying. However this maverick spend, if not addressed, will reduce the bargaining power of buyers (de Boer *et al*, 2002). In a case study on e-procurement use in GlaxoSmithKline, Kulp *et al* (2006) disclose that the company had been losing 20 to 30 cents on every dollar which was not compliant with contracts.

***Price:***

Compliance is closely linked to price as it enforces negotiated pricing levels, and price reductions from suppliers are one of the principal targets in adoption of e-procurement systems. In a study of Australian organisations, Williams & Hardy (2007) identified that the most important factor for buyers in e-procurement adoption was reduction of prices. The study by Tanner *et al* (2008) found that in e-procurement adoption, reduction in purchasing price was the highest priority amongst twelve cited goals for e-procurement. De Boer at al (2002) build a model to illustrate how different e-procurement mechanisms impact on prices. Ellram & Zsidisin (2002) suggest firms can use IT applications in purchasing to understand Total Cost of Ownership and to support target costing initiatives. Several studies of reverse auctions in particular have indicated that price reductions can be expected from suppliers, subject to factors such as commodity, competition and supplier numbers (Emiliani, 2000; Carter *et al* 2004; Smart & Harrison, 2003).

***Supplier numbers:***

There has been a long-term trend in buying organisations towards reducing supplier numbers, often through centralisation programmes or bundling of spend, where for example, Narasimhan & Das (2001) suggest that consolidation of purchases leads to greater leverage or buying power. The study by Davila *et al* (2003) revealed a reduction in the number of suppliers used by e-procurement adopters, and the authors noted that this could eventually push some suppliers out of the market. Similarly, reduced search costs through web technology may lead to higher competition in supply markets, creating more leverage for buyers (Croom & Brandon-Jones, 2007). It is suggested by Corini (2000) that buyers should reduce supplier numbers first, before embarking on an e-procurement project, as this reduces implementation cost and effort. One of the key drivers reported in a number of studies of e-procurement implementation has been the opportunity to reduce suppliers numbers and create spend leverage (Smart, 2008; Angeles & Nath, 2007; Min & Galle, 2001). Quayle (2005) points out that if the supply base reduces with e-procurement use, then SME suppliers will be faced with meeting international standards which may lead to deficiencies in, and risks for, the supply chain.

***Supplier resistance:***

A study by Yen and Ng (2002) reported that there is some resistance to e-procurement from suppliers who may not achieve benefits from the cost of development and process change involved in adoption of buyers' systems. Bartels (2004) suggests that getting suppliers to fully participate in and adopt e-procurement technologies is a major issue in implementation. Similarly Quayle (2005) reports that suppliers can be a barrier to implementation, if they are either unwilling to take part or are unclear of what is required of them. He suggests that supplier buy-in can be obtained through running pilot projects and seeking their input to the process, making them feel part of the decision-making. A study by Deeter-Schmelz *et al* (2001) equally found that suppliers can play a critical role in the adoption success of web-based purchasing systems. Supplier co-operation can be key to the success of e-procurement projects as they must also be willing to supply catalogue information (Davila *et al*, 2003). This is supported by Corini (2000) who suggests that lack of supplier catalogues or electronic content is a major hurdle to success. However, suppliers with a dominant market position may be able to force buyers to adopt their sell-side systems, as opposed to using buyer-controlled applications (Smart, 2008).

***Relationships:***

In this section we focus on the buying firm perspective of supplier relationships. The evidence on supplier relationships within e-procurement usage is, so far, rather mixed. Carr & Smeltzer (2002) suggest that where it is mediated by technology, the buyer-supplier interface is likely to change. In particular, where technology is used for routine purchases, although information exchange increases, personal contact and interaction reduces. Croom (2001) suggests that increased use of e-procurement creates more effective buyer-supplier relationships. Similarly it is proposed that e-procurement is likely to enhance rather than damage, supplier relationships and one study revealed that it reinforces hierarchical relations rather than market-based ones (Croom & Brandon-Jones, 2007). This finding was repeated by White *et al* (2004) who found that use of electronic marketplaces led to closer relationships with fewer suppliers. At the same time however, e-procurement systems lead to greater transparency in pricing and process and whilst this is a benefit to buyers, it may disadvantage suppliers as more perfect market information becomes available (Barratt & Rosdahl, 2002). Interestingly, Carr & Smeltzer (2002) found that technologies had limited utility when deployed in more complex relationships. This can be explained by the fact that strategic relationships depend more on close liaison and interaction between the contracting parties, where there will be high levels of mutual dependency (Cox, 2001).

In the study by Carr & Smeltzer (2002), the use of information technology in supply chains did not necessarily increase trust, however Croom and Brandon-Jones (2007) found that e-procurement transactions were more likely with suppliers who were well known and trusted by the buying firm. Conversely, Tucker & Jones (2000) suggest that relationships facilitated by web technology are more likely to be adversarial and characterised by lack of trust. According to McIvor *et al* (2003), the use of technology in purchasing allows buyers to spend less time on transactions and thus to focus more on value related activities, including building relationships. They also suggest that successful IT implementations require collaboration between buyers and their suppliers. Nagle *et al* (2006) differentiate between adversarial and collaborative relationships and propose that these two behavioural modes have different impacts on the use of e-procurement systems. These furthermore have an impact on the levels of integration which are possible between buyer and supplier.

Table 2: Key observations on themes identified from the literature

| **Theme** | **Key observations from the Literature** | | | |
|---|---|---|---|---|
| ***Communi-cation*** | Web technology improves communication flow in the supply chain (McIvor & Humphreys, 2004) | Interaction frequency increases, as IT improves ease of communi-cation (Carr & Smeltzer, 2002) | Increase in communication between customers and suppliers assists knowledge sharing (Croom and Brandon-Jones, 2007) | Information provision in areas such as forecasts and inventory management enables more collaboration between buyers and suppliers (Puschmann & Alt, 2005) |
| ***Integration*** | Increased levels of information exchange can lead to greater integration with suppliers (Garcia-Dastugue & Lambert, 2003). | Alternative e-procurement applications lead to differing levels of integration (Pearcy & Guinipero, 2008) | Survey findings showed there was actually little real integration with suppliers (Davila *et al*, 2003 | Tools used in e-procurement are not aimed at integrating inter-firm processes, but are designed for increasing purchasing efficiency (Cagliano *et al*, 2005) |
| ***Compliance*** | One of the drivers for e-procurement adoption for buyers has been the need to improve compliance to approved suppliers (Puschmann & Alt, 2005) | Controlling maverick spending cited as a principal benefit of e-procurement (Corini, 2000) | Implementing an e-procurement system does not necessarily eliminate the problem of maverick buying (Angeles & Nath, 2007) | Lack of compliance if not addressed, reduces the bargaining power of buyers (de Boer *et al*, 2002) |
| ***Price*** | The most important factor for buyers in e-procurement adoption was reduction of prices (Williams & Hardy, 2007). | Reduction in purchasing price was highest priority amongst twelve cited goals for e-procurement (Tanner *et al*, 2008) | Model to illustrate how different e-procurement mechanisms impact on prices (de Boer *et al*, 2002) | In reverse auctions, price reductions can be achieved, subject to factors such as commodity, competition and supplier numbers (Emiliani, 2000; Carter *et al* 2004; Smart & Harrison, 2003) |
| ***Supplier numbers*** | Reduction in the number of suppliers used by e-procurement adopters could eventually push | Reduced search costs through web technology may lead to higher competition in supply markets, | Buyers should reduce supplier numbers first, before embarking on an e-procurement | One of the key drivers for e-procurement adoption has been the opportunity to reduce suppliers numbers and |

| | | | | |
|---|---|---|---|---|
| | some suppliers out of the market (Davila *et al,* 2003) | creating more leverage for buyers over supplier numbers (Croom & Brandon-Jones, 2007) | project, as this reduces implementation cost and effort (Corini, 2000) | create spend leverage (Smart, 2008; Angeles & Nath, 2007; Min & Galle, 2001). |
| ***Supplier resistance*** | Some resistance to e-procurement from suppliers who may not achieve benefits from the cost of development and process change (Yen & Ng, 2002) | Getting suppliers to fully participate in and adopt e-procurement technologies is a major issue in implementation (Bartelse, 2004) | Suppliers can be a barrier to implementation, if they are either unwilling to take part or are unclear of what is required of them (Quayle, 2005) | Supplier co-operation can be key to the success of e-procurement projects as they must be willing to supply catalogue information (Davila *et al*, 2003) |
| ***Relation-ships*** | Where it is mediated by technology, the buyer-supplier interface is likely to change (Carr & Smeltzer, 2002) | Increased use of e-procurement creates more effective buyer-supplier relationships (Croom, 2001) | E-procurement is likely to enhance rather than damage, supplier relationships as it reinforces hierarchical relations rather than market-based ones (Croom & Brandon-Jones, 2007) | Use of electronic marketplaces leads to closer relationships with fewer suppliers (White *et al*, 2004) |
| | The use of information technology in supply chains does not necessarily increase trust (Carr & Smeltzer, 2002), | E-procurement transactions more likely with suppliers who are well known and trusted by the buying firm (Croom and Brandon-Jones , 2007) | Relationships facilitated by web technology are more likely to be adversarial and characterised by lack of trust (Tucker & Jones, 2000) | Adversarial and collaborative relationship modes have different impacts on the use of e-procurement systems (Nagle *et al*, 2006) |

The literature on reverse auctions addresses the buyer-supplier interface more specifically and this is where much of the discussion of the impact on relationships takes place. One viewpoint suggests that reverse auctions are damaging in a number of ways as they drive down prices to unsustainable levels, coerce suppliers into contracts, defeat benefits obtained through longer term collaborative efforts and can destroy relationships with suppliers which have sometimes been built up over many years (Emiliani & Stec, 2002; Giampietro & Emiliani, 2007). There is also evidence or retaliatory pricing by suppliers and

refusal to do business with some buyers, after auctions have taken place (Emiliani & Stec, 2005). Conversely, it has been suggested that auctions create a more level playing field, allow visibility of pricing for suppliers, reduce sales costs and improve the overall transaction process and time, providing benefits for suppliers as well as buyers (Smart and Harrison, 2003; Wagner & Schwab, 2004; Carter *et al*, 2004).

The key observations from this literature review are summarised in Table 2. T The review has identified that the understanding of how e-procurement impacts on supply management and on interaction with suppliers is still at an emerging stage. This nascent level of development in the domain offers gaps in knowledge and structured the formulation of a research agenda, as described in the following section.

The research project described here had several objectives. The first of these was to understand how large firms are making use of the different e-procurement applications once they have undertaken a successful implementation. Evidence from the literature is thin on this issue as there is little case evidence of actual implementations, excepting reverse auctions. Hence more knowledge is required of where firms are going with this range of technologies. This led to the first research question:

RQ1 – How are e-procurement applications being deployed by buyers?

The second aim was to understand the way in which use of such technology affects buyers' relationships with suppliers. The literature published to date offers conflicting evidence on this issue (see Table 2) but it is apparent that supplier interactions are a key concern in the studies reviewed above. Hence the second research question:

RQ2 – What impact does this deployment have on supplier interaction?

Thirdly, a clear gap exists concerning the nature of the relationship between e-procurement and procurement strategy. This issue is barely approached in the literature and an understanding is required of the cause and effect relationship between these two factors. Therefore the third research question is:

RQ3 – What is the relationship between e-procurement use and supply market strategy?

**Research Method**

The area of investigation in this paper is the impact of buying firms' e-procurement systems on supply management. As seen in the literature section, suggestions are made that supplier numbers are likely to reduce, that prices will be impacted, and that integration and relationships with buyers will be affected. However the evidence is contradictory and still at an early stage of development. Based on their case study analysis of IT and procurement process, Carr & Smeltzer (2002) have suggested that much more research is needed to properly understand the relationship between the deployment of information technology and buyer-supplier relationships. E-procurement is still an emerging mechanism and methods such as case studies and in-depth interviewing are appropriate when investigating the early stages of an organisational phenomenon (Eisenhardt, 1989). This requires an exploratory approach, which is likely to be inductive in nature whilst propositions and hypotheses are still being developed around the true impact of e-procurement tools (Yin, 2002).

The subject area needs detailed exploration – a standardised scoring approach would risk over-simplifying issues such as the complexity of managing supplier relationships, the use of segmented approaches, the role of individuals in the buyer-supplier interface and the changing face of practice as firms learn from their experiences. Whilst survey methods offer useful generalisations they usually cannot offer detailed, specific insights into firms' strategy or decision-making. The approach in this research was to use a number of industrial case studies to explore the realities of e-procurement usage as there have been a growing number of articles using surveys and questionnaires, but to date, case histories and illustrations of real life projects are still few in number.

Equally, cases allow us to compare and contrast between examples and to illustrate at a more detailed level, the impact of firms' decisions and strategies. At this point in the evolution of knowledge on e-procurement, case examples can provide a statement of what has been implemented, demonstrate its impact, and suggest reference points for firms who are undertaking similar projects. In this sense, the paper seeks to advance academic knowledge in the domain, but also to provide valuable lessons for practitioners. To achieve this, it is important to be able to evaluate the experiences of managers involved in using these technologies.

The cases were identified through access the author developed whilst conducting research in a related area. These contacts led to knowledge of a wider range of firms who were involved in e-procurement implementation. The selection of firms for this study was based on an approach developed in a similar vein of research by Tatsis *et al* (2006) who analysed e-procurement within Greek industrial firms. Their study used four cases as a basis for analysis and cross-case comparison. In this study, four large multinationals were selected from the original list of firms identified, as previous studies have suggested that firm size is one of the determinants of adoption of e-commerce technologies (Zheng *et al* 2004; Joo & Kim, 2004) Another criterion for selection was their level of maturity in e-commerce. All four companies chosen were at least two years into their e-procurement projects, as this would allow an exploration of a range of advanced issues concerning strategy, adoption, successes/failures and relationships. The firms who agreed to participate offered extensive access as they were aware that in sharing their experiences they would also obtain insight into the efforts of other firms. The firms are all large corporations with centralised procurement functions serving a distributed range of users and with similar levels of complexity within their purchasing. However in return for supplying detailed information on their strategy and performance, it was agreed that their identities would be kept confidential, hence company names are not mentioned here.

Initially, access was given to senior executives and subsequent interviews were conducted with managers involved directly in the e-procurement implementations. Interviews were conducted using the funnelling approach, starting with more general questions and moving to specifics on strategy, applications deployed, supplier issues, relationships, problems experienced, and so forth. The content for these questions was heavily informed by the literature review and the seven themes identified formed part of the discussion agenda. Open-style question structure was used to enable respondents to discuss relevant and contextual details, which mirrored their experiences during these projects. A coding system was used based on key findings and themes from the literature, and relevant to the research questions for the project. The interviews were transcribed and individual case histories were created, followed by comparing and contrasting the case details. Further data were supplied from company records, training materials and reporting systems, to help in validating the answers given in interviews. Each case is reported in the next section, followed by extrapolation of findings across the cases.

**Case Findings**

A number of e-procurement mechanisms are discussed in this article: these are described in Table 3 below.

Table 3: e-procurement applications investigated in this research

| Application | Features |
|---|---|
| **Buying/ RTP applications** (buy-side e-procurement) | An application hosted by the buying firm to allow users to search for products, place and track orders, receive and pay for purchases. Uses catalogues provided by suppliers or draws product data from supplier sites through punch-out (retrieving data from supplier web sites). Automates the 'requisition to pay' (RTP) cycle, covering placement of order, delivery through to payment of supplier. |
| **Supplier catalogue sites** (sell-side e-procurement) | Web sites hosted by an individual firm which displays its product range in an electronic catalogue. Allows customers to order online, usually using point and click system, linked to shopping basket, check-out etc. Designed by suppliers as an e-commerce channel to market. |
| **Electronic marketplaces** (many-to-many e-procurement) | Web portals which offer an online store for buyers and suppliers to conduct transactions. Suppliers offer content, allowing buyers to browse in multiple catalogues on one site. Marketplaces may be 'horizontal' in offering a wide range of products such as office supplies, or 'vertical', related to a specific industry or sector. |
| **Reverse auctions** (buyer-controlled online tenders) | Online, real time bidding events where buyers offer a contract to specified suppliers, who make reducing bids in order to gain the business. The winner in principle is the lowest bidder, although a range of criteria may be used to award the contract. Terms and conditions for the event are specified by the buying firm. |
| **e-RFX** (buyer analysis support) | A suite of applications which support buyer analysis of supply markets and suppliers. Includes search tools, supplier rating and scoring systems, bid analysis tools, assessment techniques. Designed to improving decision-making and evaluation by buyers. |

***Case 1 – Consumer product firm***

The first case study firm is a large manufacturing business operating from a UK head office, with global markets for its products. A central Procurement team is based in the HO, but much of the spend has been managed within local business units. The firm aimed to achieve closer control over this global spend through e-

procurement adoption. The focus was primarily on an automated buying system, operating in SAP, although e-RFX tools were utilised, with auctions only applying for a limited amount of tactical spend.

The firm at first did not see the introduction of e-procurement primarily as a means to manage suppliers, but rather as a mechanism to control processes within the purchasing function, and to gain better visibility and compliance in relation to its total spend. This was particularly important as re-design of the supply chain would result in some categories being sourced in greater quantities from external suppliers, rather than from internal capabilities.

Issues relating to supply management were identified as follows:

- The balance of power in some supply markets affects what the firm can control or enforce, therefore they cannot coerce all suppliers to receive orders through their SAP buying tool

- Some large suppliers incentivise them to buy through their own catalogue systems

- Better information leads to the ability to aggregate spend in a global business so they will use leverage tactics where feasible

- Due to the need for global or standardised catalogues for MRO (maintenance, repair and operating supplies), some suppliers were dropped

- The strategy was to work towards reducing supplier numbers and e-procurement assisted this process

- e-RFX tools were used to analyse supplier offers more systematically, to enable more structured decision-making on sourcing

- Better audit tools enabled buyers to make more informed decisions about suppliers

- Reverse auctions only used for limited tactical purchases as there were mixed views in the firm about the role and suitability of auctions

- Not possible to simply impose e-procurement or e-auction mechanisms on supply base – need to negotiate with and engage suppliers as part of a change process.

In this case the firm used e-procurement as a means to support its existing goals within the function. The RTP tool (see table 3) and e-RFX assisted in reducing supplier numbers through better information, although this was not a prime goal at the outset. The firm described its overall approach to e-procurement as part of 'optimised supplier management'. Despite its position as a prominent player in its sector and considerable buying power, the firm considers supply market structure very carefully and sees its Supplier Relationship Management (SRM) approach as one of working closely with suppliers. Fundamentally, relations with core suppliers would not alter, but there would be fewer suppliers over time.

***Case 2 – Telecommunications firm***

Case firm 2 is a European telecoms business which managed its Procurement from a Head Office team. The principal aim of the e-procurement project was to gain control over the spend which was distributed across many businesses worldwide. Despite a central unit which negotiated contracts and ostensibly monitored performance, compliance was a concern as the firm did not have accurate data on its total external spend.

The introduction of e-procurement was designed to support a project of internal transformation of the purchasing function, supporting a move away from transactional tasks and allowing more value-adding activities. The main project focussed on a buying system implementation (SAP/BPP), some integration into external web marketplaces and limited use of reverse auctions. Supply issues were identified as follows:

- Less focus on transactions by HO staff would allow more time for analysis leading to a more highly developed SRM programme, with emphasis on developing appropriate relationships with suppliers

- This in turn would bring more clarity to tactical and strategic purchases, leading to potential change in supply segmentation

- Purchases in tactical segments would be treated as lower priority and become more price-driven than previously

- The various e-procurement mechanisms would be used within the standard segmentation model (Risk/Value matrix); price-driven auctions would be applied in the tactical segments more extensively

- In future, key relationships in the strategic areas would be more about identifying opportunities and growing value

- Supplier numbers would be reduced across the board through catalogue compliance

- Once reliable data became available from e-procurement system, spend leverage would be deployed to decrease prices from fewer suppliers

- Use of auctions would increase once spend visibility was available.

The core focus in this example is on improving the productivity of the purchasing function. The firm was determined to move into development of its strategic and core supplier relationships which in the telecoms business are often with competitors. The impact on suppliers in the tactical segments would be more severe as there would be a more price-based approach, using spend leverage with a reduced supplier base. Here, e-procurement was used to support a strategy which altered the relationship with the firm's suppliers in the routine and leverage segments of the spend matrix.

***Case 3 - Energy firm***

The firm in this instance is an energy utility operating in Continental Europe. The business is an integrated power supplier serving clients in Northern Europe. Total external spend was estimated at slightly under 1 billion Euros. The e-procurement project had a similar purpose to that seen in case number two. The firm recruited a new head of procurement who aimed to re-engineer the purchasing function. In doing this the focus was primarily on process and in particular, improving compliance which was identified as a key problem.

The firm split the procurement cycle into strategic and transactional activities. The strategic part of the cycle dealt with sourcing, Requests for Proposals from suppliers (RFP), and methods for creating transparency in the strategic sourcing activities. The transactional part dealt with the 'requisition to pay' (RTP) cycle through the use of a buying tool and supplier catalogues, creating an audit of all spend. RFX tools were also used within the sourcing cycle to automate supplier responses to RFPs and evaluate supplier proposals. The key supply-related issues identified in the business were as follows:

- The benefits of e-RFX accrue to the buyer through reducing risk of errors and improved auditing – suppliers are unlikely to be impacted by this technology

- Catalogues were used to control spend in the tactical segments, which will lead to more categories being commoditised, based on price-based purchasing

- The firm was more prepared to replace or substitute in such categories, leading to changes in supply source as market prices move

- Auctions were used sparingly as there was some concern about harming some supply markets and reducing profit; consequently they would only be used in highly price-competitive categories

- Supplier numbers were reduced by enforcing compliance to catalogues

- The strategy of reducing supplier numbers was supported by the e-procurement implementation, which provided accurate spend data

- Sourcing and 'transactional' procurement were separated so that personnel could focus on areas of expertise; this would lead to buyers becoming more effective in dealing with suppliers

- E-procurement was used to put into operation the strategy of pushing efficiency and productivity into the procurement function.

The approach in this firm can be summarised as improving supply and supplier management. The segmentation of spend would continue, with the tactical areas being more highly automated, supported by process tools such as e-RFX and SAP's buying system. This would result in more emphasis on the sourcing area where buyers can continue to rationalise supplier numbers, drive higher compliance and use e-procurement to then implement the policy. The impact here is that through freeing up time from transactional work, buyers would be able to spend more time on strategic activity, which would impact upon the profile and number of suppliers in the future.

***Case 4 – Chemicals firm***

The firm under study here is a UK based chemicals business which specialises in products for industrial and agricultural markets, with worldwide customers. A central procurement unit establishes policy, with local buying teams responsible for undertaking spend. At the time of this investigation, the business had been involved in e-procurement for four years and had utilised buying applications,

reverse auctions, RFX and sourcing tools. The main focus had been on automating the RTP cycle, through the buying application within the SAP suite.

The introduction of e-procurement had been driven by poor data on spend across the business. Without supporting management reporting and standard process, it would be unable to leverage its buying power and improve procurement performance. There was a second rationale in aiming to move procurement managers away from transactional and towards more strategic activities, enabling more emphasis on supplier development. The issues affecting suppliers were:

- catalogues were introduced for many categories, bringing visibility to pricing and allowing more consolidated buying between business units (BUs)

- a chemicals industry marketplace (http://www.hubwoo.com) was used which facilitated aggregation of spend with other buying firms for items such as office supplies

- e-procurement tools were used aggressively to manage the leverage and routine segments (Kraljic, 1983) within the total spend, with more pressure put on price

- reverse auctions were used for the first time for commodity-type purchases such as pipe work

- auctions were also used to force existing suppliers into price discussions even where there was no firm intent to change source of supply

- improved data from e-procurement systems allowed bundling of spend between BUs and better price deals from fewer suppliers

- buying tools and e-RFX were used specifically for improved analysis of supplier offers, which supported spend reduction and phasing out of suppliers from the 'tail'

- relationships were changing with 'consumables' suppliers as these became more transactional or price-based, with old relationships not sustainable in some cases

- for strategic purchases, e-procurement tools were seen as not relevant, except where purchase orders could be automated through the SAP buying system.

In summary, there were significant changes here in the way suppliers were managed and how the procurement function operated. As in case three, buyers would be spending more time on strategic, rather than transactional functions. However the principal impact on suppliers relates to the more aggressive approach taken towards the low-risk spend, as defined in the procurement segmentation. Suppliers who had in the past enjoyed a stable relationship with the firm would find themselves in more price-based negotiations, including through e-auctions; catalogues hosted on the marketplace would open up price visibility to all business units; supplier numbers would be reduced through aggregation of spend. In effect, the firm used e-procurement mechanisms to enforce a policy of driving down prices in low risk segments.

Table 4: Use of e-procurement applications in case study firms

| **Application** | Firm 1 | Firm 2 | Firm 3 | Firm 4 |
|---|---|---|---|---|
| Buying/ RTP application | - Widely used<br>- SAP integration | - Main focus of e-p project<br>- SAP integration | - Main focus of e-p project<br>- SAP integration | - Widely used<br>- SAP integration |
| Supplier catalogue sites | - Use where incentivised | - Used for supplier controlled category | - Minimal use<br>- Some punch-out | - Minimal use<br>- Some punch-out |
| Electronic market-places | - Not used | - Used to access some larger suppliers | - Not used | - Used to aggregate spend with other buyers |
| Reverse auctions | - Limited use for tactical spend | - Limited use for leverage spend only | - Limited use for tactical spend | - Increasing use across segments |
| e-RFX | - Widely used | - Being introduced | - Widely used | - Widely used |

**Discussion**

The cases introduced here are limited in number but the case approach has the advantage of allowing the researcher to explore business impacts in detail. The cases indicate that there are some commonalities in the way e-procurement was introduced and deployed in these firms, but there are subtle variations in both the

outcomes of e-procurement usage and the impact on the supply market. These issues are explored further in relation to the research questions.

***RQ1 - How are e-procurement applications being deployed by buyers?***

Table 3 summarises the role of the different mechanisms discussed in this paper. The summary in Table 4 indicates how each case firm is deploying e-procurement mechanisms. All four firms used the buying application within the SAP suite. Two of the firms had experimented with independent software but had abandoned this as integration to internal enterprise resource planning (ERP) systems such as SAP proved problematic. As discussed in much of the literature, buying systems which automate the requisition to pay cycle offer clear benefits in reducing transaction cost, improving order cycle time, enabling compliance and providing accurate reporting on spend. These benefits were confirmed by the buying firms investigated here. Use of suppliers' catalogue sites (sell-side applications) was limited. In this scenario, the buyer uses the suppliers' website to place orders. This situation reflects the balance of power in the market and suppliers with dominant positions or operating in conditions of limited competition can avoid being coerced into buyers' RTP applications, and the resulting problem of product commoditisation. In effect, only one of the firms was making significant use of this. However suppliers' catalogues can also be accessed through 'punch-out' and the other three firms were making use of this technology (punch-out is a web technology in many RTP buying systems which allows the buyer to retrieve product data from the suppliers' web site and deposit it into the buyer's ordering system).

Use of marketplaces was also limited here, with only the chemicals industry firm utilising this for regular transactions. Many of the early marketplaces which grew in a 'gold rush' mentality in the early 2000s disappeared as it became clear their business model was not sustainable. Those which now exist offer a specific value proposition such as the opportunity to aggregate spend, or to access a wide range of suppliers, with minimum integration cost. Firm four used http://www.hubwoo.com for this specific purpose. Firm two had also experimented with marketplaces and had integrated its RTP system (through middleware) into one specific industry vertical site in order to gain access to one of its suppliers who was also a competitor – here the balance of power implied that neither trading partner was in a position to exercise dominance in how the transaction should be undertaken and in this respect the online marketplace creates a 'neutral' platform in which firms can undertake transactions.

Reverse auctions were being used by three of the firms in a limited way and it was apparent from conversation with managers at several levels that some of the negative reporting about auctions, and experiences by their suppliers, had created a cautious attitude. However firm four had a different approach and was moving more categories into auctions, after some initial experiments with commodity-type products. Their tactic of using auctions to force existing suppliers to the negotiating table demonstrated a more aggressive approach to some lower risk categories. But the mechanism was also being used in other segments which had been dominated in the past by a few powerful suppliers.

All firms were making use of e-RFX applications which were seen to offer benefits such as improved search for suppliers, analysis of tender response, supplier evaluation and ranking and metrics for managing both suppliers and spend categories. These applications are less controversial for suppliers and are primarily focussed on improving the decision-making and effectiveness of the procurement function. It was interesting how all the firms saw the extended use of these tools as supporting a policy of raising the productivity and skills of the personnel involved in procurement operations.

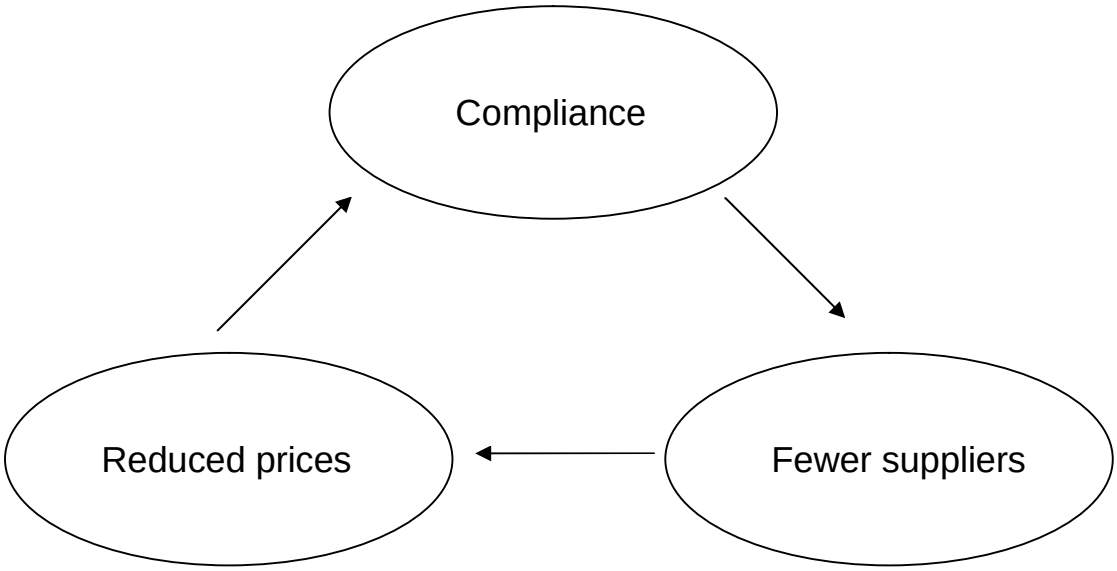
***RQ2 - What impact does this deployment have on supplier interaction?***

In this section we address the issues raised in the literature review, which were classified under seven themes (see Table 2). Firstly, communication and integration with suppliers were not seen as critical issues. The evidence from these cases suggests that buyers will be transacting with a smaller supply base more regularly, where the e-procurement tools focus primarily on the routine and leverage segments of spend. Suppliers, where more strategic relationships are developed, will see more emphasis from buyers on value-based discussions and most managers interviewed suggested this would be the main impact in terms of communication. Integration with suppliers was barely an issue for the buyers in these cases. Suppliers provided catalogues for the RTP applications, or their websites were accessed via punch-out. None of the firms used e-procurement tools as a means to integrate in other areas, through information exchange relating to inventory, demand planning etc. As demonstrated by Smart (2008), there is often little real attempt at integration of business processes in such situations. In fact there is a fundamental misunderstanding in much of the literature about the role of e-procurement, as its applications are not designed to support supply chain integration. This research confirms the statement by Cagliano *et al* (2005: 1331) that 'e-sourcing and e-procurement tools such as e-

auctions, RFX applications, e-catalogues, etc. are aimed at increasing purchasing efficiency, rather than integrating inter-firm processes'.

The identified themes of compliance, price and supplier numbers were all found to be closely linked in these cases and tend to operate in a virtuous circle (see Figure 1). For all the firms in the study, compliance to approved suppliers was a major driver for e-procurement adoption and in fact was identified by all the respondents as a key part of the business case. There was a suggestion from two of the firms that in the early days of web purchasing, when buyers were using suppliers' catalogues sites, compliance actually worsened as it was much simpler for individuals to order using point and click technology, popularised by consumer sites such as www.amazon.com. Compliance in turn builds trust, where the supplier can see that forecasts or guarantees given on spend volume are delivered by the customer. Furthermore, it creates leverage where spend categories are bundled and this was being practised by three of the firms, with widely distributed businesses which formerly exercised autonomy on how spend was allocated.

Figure 1: Virtuous circle between Compliance, Price and Supplier numbers in e-procurement



Price was clearly being affected in all four cases. Price improvements came from the higher volumes to approved suppliers and all of the firms had set targets for cost savings from suppliers, which formed part of the business justification for investment in the technology. Firm one took the most cautious approach to this as their policy was to ensure good supplier relations, however the firm also intended to reduce numbers where practical. In firm two there was a clear intention to move towards harder negotiations on price once better data was available. Firm three had the biggest problem with compliance and so used the RTP system to achieve specific compliance goals. It was less concerned with supplier numbers but expected those to reduce as an effect of the compliance programme through cutting off the tail within the pareto analysis. For firm four, the approach to price was more aggressive. Compliance was expected from the system, with a specific intention to reduce supplier numbers and re-negotiate price levels with remaining suppliers. Auctions were also being used to support the reduction in existing prices. In effect, certain categories of spend were being pushed into the low risk segments, increasing the risk of commoditisation for some suppliers.

Supplier resistance did not emerge here as a significant issue in the projects, although there were instances where suppliers had been initially unwilling to provide catalogues or content, but incentives were offered to overcome this (case firm two). Case firm one was quite concerned with maintaining relationships with some large suppliers established over long duration and so used those suppliers' systems. Case firm four had met supplier resistance to auctions but had decided it could afford to be more aggressive in their use as some supply markets were characterised by sufficient competition. This issue reflects the nature of the power balance between buyer and supplier and it is clear that where buyers do not have the stronger position vis-a-vis certain suppliers, they may choose, or be obliged to, adopt that supplier's system. Where the supply market is fragmented, highly competitive and not dominated by key suppliers, then buyers will be able to impose use of their buying applications. There are clear benefits for suppliers who drive adoption of their own systems, such as lower sales cost, automating of the transaction, integration to their own internal ERP systems and domination of the channel to market.

Perhaps the most important issue identified in the literature - relationships - is also the most complex to answer. It is evident that the buying firms examined here did not see their relationships as a function of the e-procurement application tools being used (although the jury is perhaps still to return a verdict on the

impact of auctions). Indeed, the approach in all the four firms was to establish a clear policy on the supply market through use of a risk/value segmentation, and to implement that policy with e-procurement tools as a supporting mechanism. The approach in all the firms was to differentiate between the transactional relationships, controlled through RTP and auctions, and the critical ones. All four firms aimed to move their key purchasing personnel away from transactions and towards more value-added activities. There was also evidence of some categories being moved into tactical segments to enable price reductions. The value-added focus involves more time spent on strategic spend and developing the relationship with the suppliers in that category. This was where the procurement function could add benefit to the organisation by identifying areas for bringing value into the business through more effective outsourcing and use of supplier expertise, technology or innovation. The firms would be focussing their SRM efforts into these issues. The e-procurement toolbox facilitates this step by automating many of the mundane activities of purchasing process.

***RQ3 - What is the relationship between e-procurement use and supply market strategy?***

It can be seen from the comments in the previous section that e-procurement tools are used in these firms to support and develop the strategic decisions taken in relation to supply market structure. The suite of e-procurement applications, which includes some not discussed in this paper, can be deployed in relation to specific activities and have different functions and purpose. It is important for both practitioners and academics to realise the differences in these applications as some commentators in both domains have not differentiated between them accurately. In this respect we can posit that the e-procurement applications are tactical tools which need to be deployed for specific ends. Those ends are defined by the strategic framework of procurement, constructed through: alignment with corporate goals, spend analysis, segmentation of markets and decisions on additional issues such as balance of overseas to local sourcing. Ellram and Zsidisin (2001) suggest that buyer-supplier relationships strongly influence the use of IT. This article goes further, and postulates that relationship modes, defined within a strategic procurement framework, directly influence how e-procurement tools should be deployed by the buying firm.

Furthermore, it emerged that use of e-procurement or e-sourcing applications is in large part determined by the problem(s) the firm is facing. Deployment of such applications needs to be seen in context and understood in relation to several

legacy issues, which have been explored above. All four cases showed similar approaches to procurement strategy development, however the tactics used for e-procurement deployment varied according to the mixture of problems, nature of organisational and IT legacies, resources available and functional targets.

**Conclusions & Management Implications**

Since the influential article by Kraljic (1983), and subsequent progression of the concepts, procurement has emerged as a more strategic activity within the firm and the components of a strategic approach such as supply market analysis and segmentation, amongst others, have been adopted by many forward-thinking buying organisations. The firms in the cases discussed here have all developed strategic approaches to the role and contribution of the procurement function, largely based on the segmentation model. They were quite explicit that the approach to e-procurement use followed from their strategic intent. From this perspective it is evident that e-procurement is a tactical tool whose main purpose is to support the strategic goals of the function.

Although there was no clear evidence that e-procurement was influencing or changing strategy, tactics within spend segmentation are developing. For example, we saw firms pushing harder in routine and leverage segments via the use of supplier consolidation, and reverse auctions. In this sense, organisations use e-procurement to drive through policies which will impact most effectively on the business – this could be either closer collaboration with fewer suppliers, price reductions in leverage spend, better decision-making through e-RFX or forcing suppliers to the negotiation table with auctions. In this respect, relationships with some suppliers may change, where a more rigid price-based policy is enforced for specific categories.

Consequently, there was no *de facto* impact on supply management and suppliers from applying e-procurement tools. So e-procurement does not influence relationships *per se*, it facilitates the implementation of a coherent supply strategy which determines the expected relationship mode. B2B interactions take place within a narrow social system, with prescribed rules of behaviour, defined roles and contractual/legal obligations. The impact of web technology will not be driven by the functionality of such applications, but by the way they are used. Problems such as poorly-defined supply strategy or unclear supplier objectives will not be resolved through e-procurement. Auctions can be an example of where problems may occur - where applied inappropriately or the subject of poor

decision-making by buyers, they may damage relationships or even future sources of supply. However, the same may be said of any technology or business solution, when subject of a poorly-specified implementation. Like all information technology, these are tools – how we use them within the rules prescribed by the firm for their application, determine their usefulness. As Porter (2001) has elucidated, in determining the future of a business, strategy comes before the Internet.

The e-procurement phenomenon is still at an early stage of development and adoption, but this research has demonstrated that different tactical uses of e-procurement will have varying outcomes for both buyer and supplier, and those variations need to be better understood in order to interpret the longer-term impact of these mechanisms. The findings from this research allow us to offer some propositions on the impact of e-procurement in relation to suppliers and supply management. These propositions are presented in Table 4, responding to the seven core literature themes identified in this article, and offer a further agenda for research in this domain.

Finally, from a managerial perspective, an important factor is that the use of e-sourcing and e-procurement tools is allowing the procurement function to re-invent itself in some firms. With a move away from the transactional, processing activities of buying and ordering, procurement managers can begin to develop the more critical relationships within the supply base. All the firms in this study saw this development as one of the key outcomes of e-procurement utilisation and as a means to improve their function's productivity, effectiveness and potential for value creation within the business. In addition, managers should recognise that a transparent supply strategy needs to be developed in order to establish the type of interactions buyers will pursue with segments of the supply market, and as demonstrated here, e-procurement tools can be deployed to implement more effectively a coherent segmentation policy.

Table 5 Supplier-related issues in e-procurement: Propositions from research

| Theme | Propositions from case study findings |
|---|---|
| **Communication** | P1: Communication volume between buyers & suppliers increases with e-procurement but over time results in more contact with fewer suppliers |
| **Integration** | P2: Integration with suppliers is superficial and only encompasses the 'RTP' cycle: buyers do not use e-procurement systems to drive supply chain integration |
| **Compliance** | P3: Compliance is a major driver for e-procurement projects as e-procurement tools improve compliance to contract and preferred suppliers, allowing buyers to aggregate spend |
| **Price** | P4: Successful e-procurement projects focus on creating spend leverage with a smaller supply base; however reverse auctions are used as the principal mechanism to specifically drive price reduction |
| **Supplier numbers** | P5: Buying firms using e-procurement aim to reduce supplier numbers: e-procurement tools facilitate this objective whilst reducing transactional cost with those remaining |
| **Supplier resistance** | P6: Powerful suppliers can resist attempts by buyers to impose terms of e-procurement interaction and can drive buyers to adopt their catalogue or sell-side systems |
| **Relationships** | P7: Relationships are not driven by the technology type, they are determined by buyers' spend and segmentation strategies; hence e-procurement tools are used as tactical mechanisms to support strategic procurement decision-making |

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